CLAIMS

1. A map creation device comprising:

a three-dimensional-ground-information memory unit that stores three-dimensional ground information indicating a three-dimensional shape of a ground;

a simple-three-dimensional-ground-information creating unit that creates simple-three-dimensional ground information having less amount of data than the three-dimensional ground information, using the three-dimensional ground information stored by the three-dimensional-ground-information memory unit;

a three-dimensional-on-ground-structure-information creating unit that creates, by adding height information to two-dimensional on-ground-structure information indicating a two-dimensional shape of a on-ground structure that is present on a surface of the ground, three-dimensional on-ground-structure information indicating a three-dimensional shape of the on-ground structure, using the simple-three-dimensional ground information created by the simple-three-dimensional ground-information creating unit; and

a three-dimensional-map-information creating unit that creates three-dimensional map information, based on the three-dimensional ground information stored by the three-dimensional-ground-information memory unit and the three-dimensional on-ground-structure information created

by the three-dimensional-on-ground-structure creating unit.

2. The map creation device according to claim 1, further comprising

a two-dimensional-shape-information memory unit that stores reference-line information indicating a reference-line of the two-dimensional shape of the on-ground structure present on the surface of the ground, and width information indicating a width of the two-dimensional shape of the on-ground structure in a direction perpendicular to the reference-line, wherein

the three-dimensional-on-ground-structure-information creating unit creates the three-dimensional on-ground-structure information, using the two-dimensional shape information stored by the two-dimensional shape information memory unit and the simple-three-dimensional ground information created by the simple-three-dimensional-ground-information creating unit.

3. The map creation device according to claim 1 or 2, wherein

the simple-three-dimensional-ground-information creating unit creates as the simple-three-dimensional ground information, using two-dimensional polygon information indicating a two-dimensional plane split into a plurality of polygons, three-dimensional polygon

information in which height information is added to vertices of the polygons using the three-dimensional ground information.

4. The map creation device according to claim 3, wherein the simple-three-dimensional-ground-information creating unit sets a mean value of height information of the three-dimensional ground information present around the vertices of the polygons to the height information of the vertices of the polygons.

5. The map creation device according to claim 3, wherein the three-dimensional-on-ground-structure-information creating unit creates the three-dimensional on-ground-structure information by adding, using the height information of the vertices of the polygons, the height information to the two-dimensional on-ground-structure information.

6. The map creation device according to claim 1 or 2, wherein the three-dimensional-on-ground-structure-information creating unit extracts, from the simple-three-dimensional ground information, height information at a specific position of the two-dimensional shape of the on-ground structure, and creates the three-dimensional on-ground-structure information by adding the height

information extracted to the specific position.

7. The map creation device according to claim 6, wherein the three-dimensional-map-information creating unit adjusts the height information extracted from the simple-three-dimensional ground information, and adds the height information adjusted to the specific position.

8. The map creation device according to claim 1 or 2, further comprising

a thickness-information memory unit that stores thickness information indicating a thickness of the two-dimensional shape of the on-ground structure in a height direction, wherein

the three-dimensional-on-ground-structure-information creating unit creates the three-dimensional on-ground-structure information by adding the thickness information stored by the thickness-information memory unit to the two-dimensional on-ground-structure information.

9. The map creation device according to claim 8, wherein the three-dimensional-map-information creating unit adjusts the thickness information stored in the thickness-information memory unit, and adds the thickness information adjusted to the two-dimensional on-ground-structure information.

10. A navigation device comprising:

a three-dimensional-ground-information memory unit that stores three-dimensional ground information indicating a three-dimensional shape of a ground;

a point-information input unit that receives an input of point information indicating an arbitrary point;

a three-dimensional-ground-information extracting unit that extracts, from the three-dimensional ground information stored by the three-dimensional-ground-information memory unit, three-dimensional ground information indicating a three-dimensional shape of a ground within a predetermined range including the point information input by the point-information input unit;

a simple-three-dimensional-ground-information creating unit that creates, using the three-dimensional ground information extracted by the three-dimensional-ground-information extracting unit, simple-three-dimensional ground information having less amount of data than the three-dimensional ground information;

a three-dimensional-on-ground-structure-information creating unit that creates, by adding height information to two-dimensional on-ground-structure information indicating a two-dimensional shape of an on-ground structure present on a surface of the ground within the range including the point information using the simple-

three-dimensional ground information created by the simple-three-dimensional-ground-information creating unit, three-dimensional on-ground-structure information indicating a three-dimensional shape of the on-ground structure;

a three-dimensional map information creating unit that creates three-dimensional map information, based on the three-dimensional ground information extracted by the three-dimensional-ground-information extracting unit and the three-dimensional on-ground-structure information created by the three-dimensional-on-ground-structure information creating unit;

a map display information creating unit that creates, using the three-dimensional map information, map display information viewed from a view position corresponding to a position of the point information;

a display unit that includes a display; and

a display-control unit that controls the display and displays a map screen using the map display information created by the map display information creating unit.

11. The navigation device according to claim 10, further comprising

a route searching unit that searches, based on the point information indicating arbitrary two points input by the point-information input unit, a route between the two

points, wherein

the three-dimensional-on-ground-structure-information creating unit creates the three-dimensional on-ground-structure information corresponding to the route searched by the route searching unit so as to emphasize the three-dimensional on-ground-structure information.

12. A map creation method comprising:

a three-dimensional-ground-information inputting step of imputing three-dimensional ground information indicating a three-dimensional shape of a ground;

a simple-three-dimensional-ground-information creating step of creating, using the three-dimensional ground information input at the three-dimensional-ground-information-inputting step, simple-three-dimensional ground information having less amount of data than the three-dimensional ground information;

a three-dimensional-on-ground-structure-information-creating step of creating, by adding height information to two-dimensional on-ground-structure information indicating a two-dimensional shape of an on-ground structure present on a surface of the ground within the range including the point information using the simple-three-dimensional ground information created at the simple-three-dimensional-ground-information-creating step, three-dimensional on-ground-structure information indicating a

three-dimensional shape of the on-ground structure; and

a three-dimensional-map-information-creating step of creating three-dimensional map information, based on the three-dimensional ground information input at the three-dimensional-ground-information inputting step and the three-dimensional on-ground-structure information created at the three-dimensional-on-ground-structure-information creating step.

13. A map creation program that causes a computer to execute the map creation method.

14. A computer-readable recording medium that stores the program according to claim 13.